

SOUTHEAST ALASKA SOCKEYE SALMON
ESCAPEMENT DETERMINATIONS
PORT SNETTISHAM AND HUGH SMITH WEIRS, 1989



By

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ABSTRACT

The 1989 sockeye salmon (*Oncorynchus nerka*) escapements to Crescent and Hugh Smith Lakes were 18.4% and 32.5% of the averages for their respective years of record. Speel Lake sockeye salmon escapement was 170% of the average of prior year escapements. Escapement estimates for sockeye salmon returning to McDonald Lake in 1989 were approximately 90% of the average observed from 1979-88.

INTRODUCTION

There is a continuing need for accurate stock status information that is used in relation to U.S./Canada Treaty allocations and special management actions. This program was designed to contribute to the documentation of escapements into Southeast Alaska sockeye salmon systems that contribute to fisheries intercepting mixed U.S. and Canadian stocks. The 1989 work was a continuation of escapement documentation that has been conducted since 1982. Information related to the magnitude and timing of escapements to these systems is essential to the estimation of their production potential. In most cases aerial and foot surveys have been proven to be ineffective means of enumerating sockeye salmon escapements due to the lake spawning characteristics of the species. Weirs were the method of choice since they have the ability to provide accurate run timing information and a means of collecting biological samples that add to the data base.

ESCAPEMENT ENUMERATION

Sockeye salmon escapements were enumerated at Crescent, Speel, and Hugh Smith Lakes. Foot surveys were used to estimate escapements to McDonald Lake (Figure 1). Crescent and Speel Lakes are tributary to Snettisham Inlet, immediately south of the Taku Inlet and contribute to sockeye harvests in the District 11 B drift net fishery. Hugh Smith Lake is tributary to Boca de Quadra Inlet near Alaska's southern boundary with Canada and its stocks are harvested by the District 1 Drift gill net and Districts 1,2,3, and 4 purse seine fisheries; McDonald Lake sockeye were primarily harvested by the District 6 drift gill net fishery.

Methods and Procedures

Steel picket weirs were used to control the movement of salmon into the respective spawning systems and allowed visual counting of the escapement. Fish were counted as they passed through an opening in the weir created by the removal of one or more of the pickets. Pickets were removed daily or as often as fish were present and willing to pass through the weir. Additional escapement data were collected at McDonald Lake by stream surveys; estimates of the total escapement were derived by using the weir count:stream survey proportion developed during years of weir operation (M. Haddix, Alaska Department of Fish and Game, F.R.E.D. Division, Ketchikan, personal communication).

An upstream migrant trap was incorporated in to each of the weirs to allow the capture of adults and subsequent collection of scales, length, and sex of the fish; scale samples were used for age determination and documentation of scale characteristics for stock identification purposes. Scales were mounted on gum cards and data recorded on mark/sense forms as described by Clutter and Whitsel (1956). The mounted scales and data forms were analyzed and results reported by the ADF&G Region I Salmon Management Group (Rowse 1990).

Results and Discussion

Salmon escapements to Speel, Crescent, and Hugh Smith Lakes for the years of record are presented in Appendix A.1. and Figures 2-4. The 1989 sockeye escapement to Speel Lake was 170% of the previous 6 year average; the 1989 Crescent Lake escapement was 18.4% of average for the years of record. The 1989 Hugh Smith escapement was 32.5% of the average for the previous 7 years. The average sockeye escapement to McDonald Lake, since 1979 was 87,387 fish; the 1989 escapement was approximately 90% of that average (Appendix A.2).

Peak daily escapements to Speel, Crescent, and Hugh Smith lakes occurred on 4, 5, and 6 August, respectively (Appendix B.1, 2, and 3). These escapements represented approximately 35%, 12%, and 14% of the seasons total escapement of sockeye salmon to these systems.

Management has taken steps to reduce the harvest of Snettisham sockeye in the District 11 B fishery through time and area closures in an effort to rebuild the Crescent Lake stocks. These efforts appear to have benefitted the Speel Lake stocks which have shown relatively strong returns in all years except 1988; however, Crescent Lake stocks have failed to demonstrate a positive response and anticipated returns from relatively good escapements, i.e., 1983, have failed to reach the level expected.

LITERATURE CITED

- Clutter, R. and L. Whitsel. 1956. Collection and interpretation of sockeye salmon scales. Bull. Int. Pac. Fish. Comm., No. 9.
- Rowse, M.L., S.A. McPherson, and M.A. Olsen. 1990. Abundance age, sex and size of sockeye salmon catches in Southeast Alaska in 1989. Alaska Department of Fish and Game Commercial Fisheries Division, Technical Data Report. In Press.

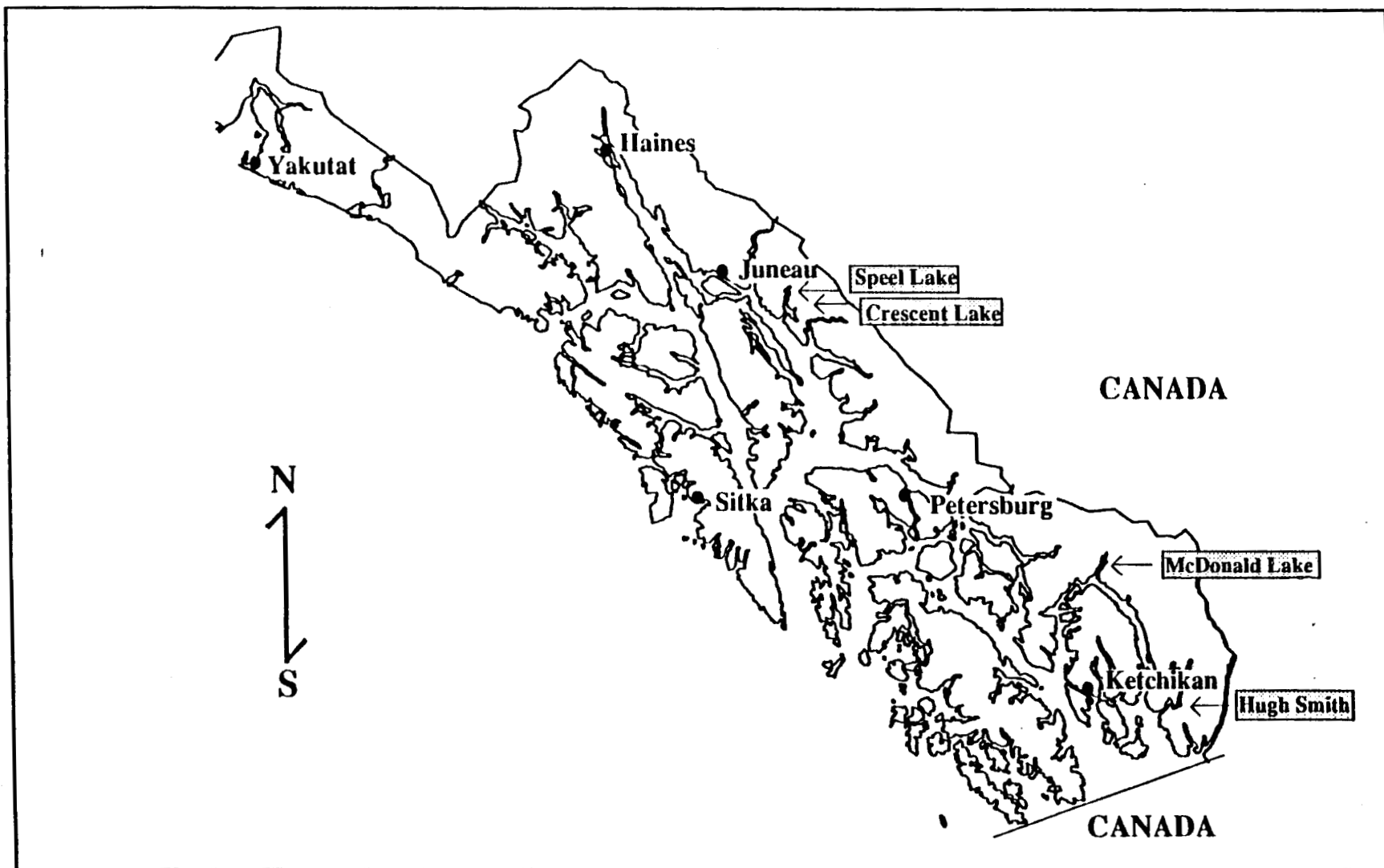


Figure 1. Selected Southeast Alaska sockeye spawning systems.

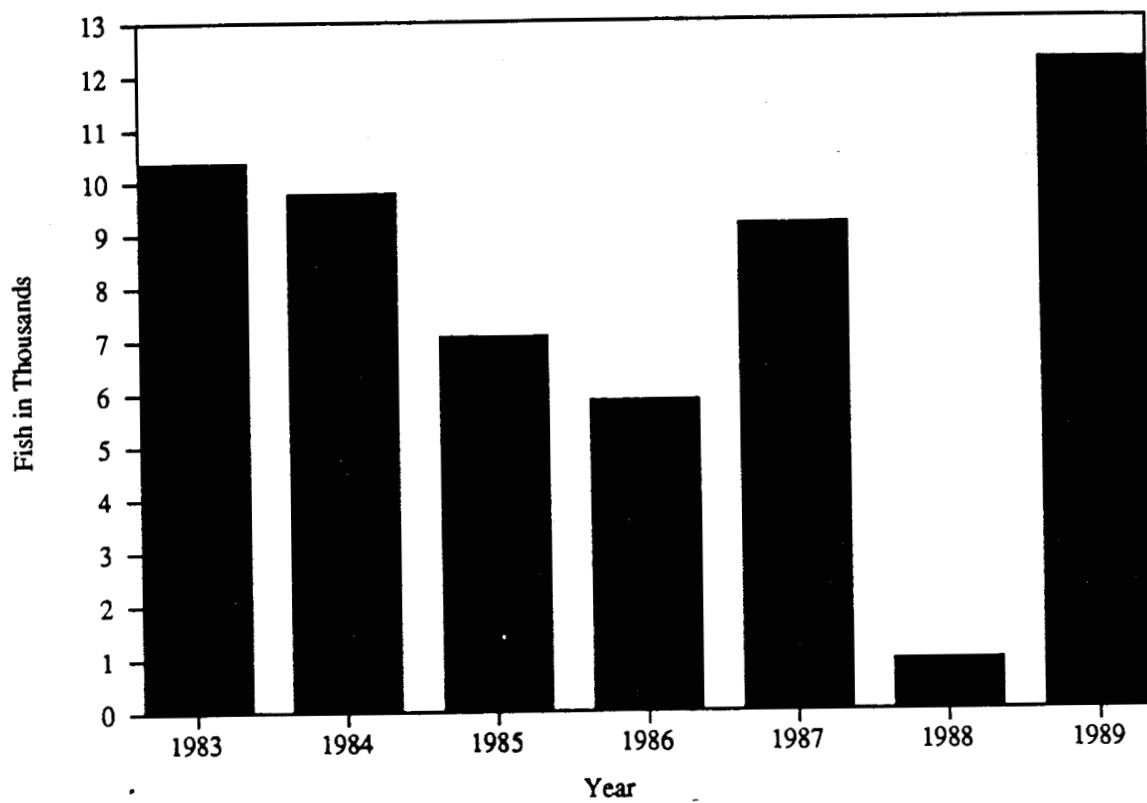


Figure 2. Speel Lake annual sockeye salmon escapements, 1983-1989.

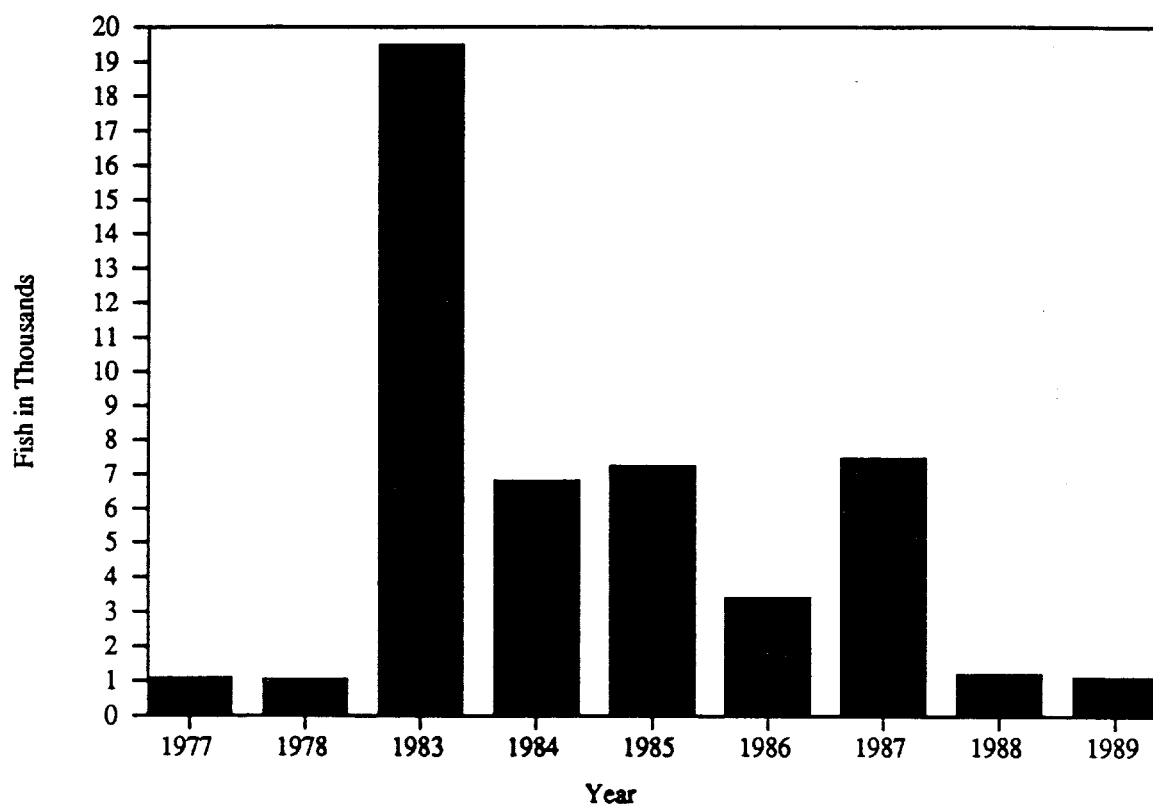


Figure 3. Crescent Lake annual sockeye salmon escapements, 1977-1978, 1983-1989.

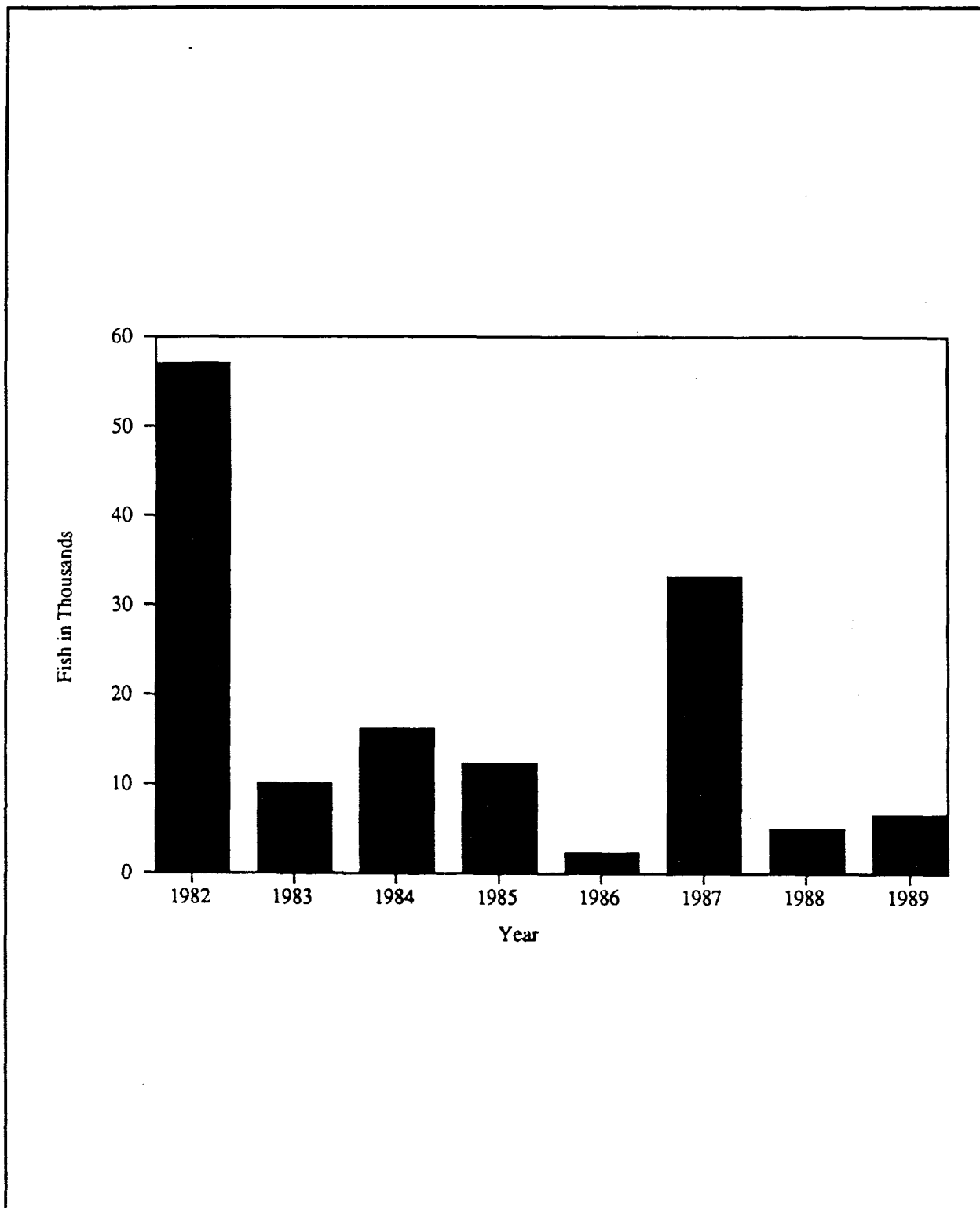


Figure 4. Hugh Smith Lake annual sockeye salmon escapements, 1982-1989.

APPENDICES

Appendix A.1. Annual salmon escapements through Speel, Crescent, and Hugh Smith Lakes, 1977-89.

Year	Sockeye	Coho	Pink	Chum	King	Total	Period Operated
Speel							
1983	10,362	43	143	0	0	10,548	7/01-9/22
1984	9,764	6	26	0	0	9,796	7/15-9/08
1985	7,073	0	0	2	0	7,075	7/15-8/29
1986	5,860	0	7	0	0	5,867	7/13-8/29
1987	9,161	0	31	0	0	9,161	7/15-8/28
1988	934	0	0	0	0	934	7/14-8/29
1989	12,229	0	0	0	1	12,230	7/12-9/5
Average	7,192	8	35	0	0		1983-88
Crescent							
1977	1,079	10	3,449	115	5	4,658	7/07-8/29
1978	1,049	62	1,958	13	0	3,082	6/28-8/13
1983	19,476			no record	1	19,477	6/20-8/24
1984	6,807	33	6,047	685	4	13,576	7/10-9/12
1985	7,249	108	9,691	746	1	17,795	7/16-8/30
1986	3,405	28	1,046	228	4	4,711	7/12-8/29
1987	7,459	33	6,159	261	5	7,451	7/13-8/28
1988	1,199	0		no record	0	1,199	7/11-8/28
1989	1,099	8	1,596	142	33	2,878	7/16-8/27
Average	7,599	40	3,824	480	3		1977-78, 1983-88
Hugh Smith							
1982	56,956						6/7-10/27
1983	10,036						6/1-9/30
1984	16,191						6/6-11/25
1985	12,298						6/16-11/8
1986	6,500 ^{a/}						6/9-10/28
1987	33,204						6/8-9/16
1988	4,960						6/5-10/4
1989	6,512						6/2-10/24
Average	20,021						1982-88

^{a/} A hole had developed near the bottom of the weir and subsequent stream surveys indicated that approximately 6,500 sockeye had escaped to the lake. The average presented represents the 1986 estimated escapement to Hugh Smith rather than the observed.

Appendix A.2.

Annual sockeye salmon escapements to McDonald lake, 1979-89.

Year	Escapement	Type
1979	30,900	Expanded Escapement count
1980	77,344	Expanded Escapement count
1981	129,653	weir
1982	16,587	weir
1983	56,142	weir
1984	121,224	weir
1985	103,555	Expanded Escapement count
1986	98,134	Expanded Escapement count
1987	170,000	Expanded Escapement count
1988	70,335	Expanded Escapement count
1989	78,324	Expanded Escapement count
1979-88 Average	87,387	

Appendix B.1.

Daily sockeye salmon counts and associated statistics from Speel Lake, 1989.

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
July 12	0	0	0.0000	0.0000
July 13	0	0	0.0000	0.0000
July 14	0	0	0.0000	0.0000
July 15	0	0	0.0000	0.0000
July 16	0	0	0.0000	0.0000
July 17	0	0	0.0000	0.0000
July 18	0	0	0.0000	0.0000
July 19	0	0	0.0000	0.0000
July 20	1	1	0.0001	0.0001
July 21	0	1	0.0000	0.0001
July 22	0	1	0.0000	0.0001
July 23	3	4	0.0002	0.0003
July 24	0	4	0.0000	0.0003
July 25	5	9	0.0004	0.0007
July 26	14	23	0.0011	0.0019
July 27	21	44	0.0017	0.0036
July 28	2	46	0.0002	0.0038
July 29	101	147	0.0083	0.0120
July 30	424	571	0.0347	0.0467
July 31	459	1,030	0.0375	0.0842
Aug. 1	343	1,373	0.0280	0.1123
Aug. 2	368	1,741	0.0301	0.1424
Aug. 3	331	2,072	0.0271	0.1694
Aug. 4	4,253	6,325	0.3478	0.5172
Aug. 5	28	6,353	0.0023	0.5195
Aug. 6	169	6,522	0.0138	0.5333
Aug. 7	5	6,527	0.0004	0.5337
Aug. 8	199	6,726	0.0163	0.5500
Aug. 9	133	6,859	0.0109	0.5609
Aug. 10	222	7,081	0.0182	0.5790
Aug. 11	229	7,310	0.0187	0.5978
Aug. 12	182	7,492	0.0149	0.6126
Aug. 13	1,188	8,680	0.0971	0.7098
Aug. 14	47	8,727	0.0038	0.7136
Aug. 15	95	8,822	0.0078	0.7214
Aug. 16	40	8,862	0.0033	0.7247
Aug. 17	15	8,877	0.0012	0.7259
Aug. 18	93	8,970	0.0076	0.7335
Aug. 19	8	8,978	0.0007	0.7342
Aug. 20	10	8,988	0.0008	0.7350
Aug. 21	88	9,076	0.0072	0.7422
Aug. 22	894	9,970	0.0731	0.8153
Aug. 23	400	10,370	0.0327	0.8480

--Continued--

Appendix B.1. (page 2 of 2.)

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
Aug. 24	123	10,493	0.0101	0.8580
Aug. 25	60	10,553	0.0049	0.8629
Aug. 26	138	10,691	0.0113	0.8742
Aug. 27	166	10,857	0.0136	0.8878
Aug. 28	85	10,942	0.0070	0.8948
Aug. 29	38	10,980	0.0031	0.8979
Aug. 30	3	10,983	0.0002	0.8981
Aug. 31	0	10,983	0.0000	0.8981
Sept. 1	34	11,017	0.0028	0.9009
Sept. 2	0	11,017	0.0000	0.9009
Sept. 3	20	11,037	0.0016	0.9025
Sept. 4	1,114	12,151	0.0911	0.9936
Sept. 5	18	12,169	0.0015	0.9951
Sept. 6	60	12,229	0.0049	1.0000

Mean Day of Migration = Aug. 11 Variance = 122.4 Days squared

Appendix B.2. Daily sockeye salmon counts and associated statistics from Crescent Lake, 1989.

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
July 16	0	0	0.0000	0.0000
July 17	0	0	0.0000	0.0000
July 18	0	0	0.0000	0.0000
July 19	4	4	0.0036	0.0036
July 20	3	7	0.0027	0.0064
July 21	0	7	0.0000	0.0064
July 22	3	10	0.0027	0.0091
July 23	9	19	0.0082	0.0173
July 24	25	44	0.0227	0.0400
July 25	2	46	0.0018	0.0419
July 26	7	53	0.0064	0.0482
July 27	10	63	0.0091	0.0573
July 28	14	77	0.0127	0.0701
July 29	26	103	0.0237	0.0937
July 30	51	154	0.0464	0.1401
July 31	10	164	0.0091	0.1492
Aug. 1	50	214	0.0455	0.1947
Aug. 2	40	254	0.0364	0.2311
Aug. 3	2	256	0.0018	0.2329
Aug. 4	48	304	0.0437	0.2766
Aug. 5	128	432	0.1165	0.3931
Aug. 6	58	490	0.0528	0.4459
Aug. 7	29	519	0.0264	0.4722
Aug. 8	32	551	0.0291	0.5014
Aug. 9	70	621	0.0637	0.5651
Aug. 10	17	638	0.0155	0.5805
Aug. 11	36	674	0.0328	0.6133
Aug. 12	61	735	0.0555	0.6688
Aug. 13	91	826	0.0828	0.7516
Aug. 14	59	885	0.0537	0.8053
Aug. 15	37	922	0.0337	0.8389
Aug. 16	17	939	0.0155	0.8544
Aug. 17	19	958	0.0173	0.8717
Aug. 18	47	1005	0.0428	0.9145
Aug. 19	8	1013	0.0073	0.9217
Aug. 20	32	1045	0.0291	0.9509
Aug. 21	8	1053	0.0073	0.9581
Aug. 22	6	1059	0.0055	0.9636
Aug. 23	12	1071	0.0109	0.9745
Aug. 24	8	1079	0.0073	0.9818
Aug. 25	6	1085	0.0055	0.9873
Aug. 26	6	1091	0.0055	0.9927
Aug. 27	4	1095	0.0036	0.9964
Aug. 28	4	1099	0.0036	1.0000
Mean Day of Migration = Aug. 8 Variance = 58.3 Days squared				

Appendix B.3.

Daily sockeye salmon counts and associated statistics from Hugh Smith Lake, 1989.

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
June 2	0	0	0.0000	0.0000
June 3	0	0	0.0000	0.0000
June 4	0	0	0.0000	0.0000
June 5	0	0	0.0000	0.0000
June 6	0	0	0.0000	0.0000
June 7	0	0	0.0000	0.0000
June 8	0	0	0.0000	0.0000
June 9	0	0	0.0000	0.0000
June 10	0	0	0.0000	0.0000
June 11	1	1	0.0002	0.0002
June 12	0	1	0.0000	0.0002
June 13	0	1	0.0000	0.0002
June 14	0	1	0.0000	0.0002
June 15	0	1	0.0000	0.0002
June 16	3	4	0.0005	0.0006
June 17	0	4	0.0000	0.0006
June 18	1	5	0.0002	0.0008
June 19	1	6	0.0002	0.0009
June 20	2	8	0.0003	0.0012
June 21	0	8	0.0000	0.0012
June 22	0	8	0.0000	0.0012
June 23	1	9	0.0002	0.0014
June 24	3	12	0.0005	0.0018
June 25	2	14	0.0003	0.0021
June 26	4	18	0.0006	0.0028
June 27	2	20	0.0003	0.0031
June 28	6	26	0.0009	0.0040
June 29	6	32	0.0009	0.0049
June 30	2	34	0.0003	0.0052
July 1	17	51	0.0026	0.0078
July 2	15	66	0.0023	0.0101
July 3	12	78	0.0018	0.0120
July 4	0	78	0.0000	0.0120
July 5	3	81	0.0005	0.0124
July 6	1	82	0.0002	0.0126
July 7	15	97	0.0023	0.0149
July 8	49	146	0.0075	0.0224
July 9	4	150	0.0006	0.0230
July 10	22	172	0.0034	0.0264
July 11	42	214	0.0064	0.0329
July 12	18	232	0.0028	0.0356
July 13	63	295	0.0097	0.0453
July 14	8	303	0.0012	0.0465
July 15	33	336	0.0051	0.0516

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Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
July 16	10	346	0.0015	0.0531
July 17	16	362	0.0025	0.0556
July 18	43	405	0.0066	0.0622
July 19	12	417	0.0018	0.0640
July 20	48	465	0.0074	0.0714
July 21	9	474	0.0014	0.0728
July 22	31	505	0.0048	0.0775
July 23	29	534	0.0045	0.0820
July 24	14	548	0.0021	0.0842
July 25	11	559	0.0017	0.0858
July 26	16	575	0.0025	0.0883
July 27	31	606	0.0048	0.0931
July 28	4	610	0.0006	0.0937
July 29	31	641	0.0048	0.0984
July 30	19	660	0.0029	0.1014
July 31	7	667	0.0011	0.1024
Aug. 1	32	699	0.0049	0.1073
Aug. 2	160	859	0.0246	0.1319
Aug. 3	95	954	0.0146	0.1465
Aug. 4	141	1095	0.0217	0.1682
Aug. 5	620	1715	0.0952	0.2634
Aug. 6	886	2601	0.1361	0.3994
Aug. 7	40	2641	0.0061	0.4056
Aug. 8	120	2761	0.0184	0.4240
Aug. 9	485	3246	0.0745	0.4985
Aug. 10	227	3473	0.0349	0.5333
Aug. 11	209	3682	0.0321	0.5654
Aug. 12	614	4296	0.0943	0.6597
Aug. 13	121	4417	0.0186	0.6783
Aug. 14	764	5181	0.1173	0.7956
Aug. 15	293	5474	0.0450	0.8406
Aug. 16	124	5598	0.0190	0.8596
Aug. 17	22	5620	0.0034	0.8630
Aug. 18	25	5645	0.0038	0.8669
Aug. 19	62	5707	0.0095	0.8764
Aug. 20	42	5749	0.0064	0.8828
Aug. 21	104	5853	0.0160	0.8988
Aug. 22	39	5892	0.0060	0.9048
Aug. 23	6	5898	0.0009	0.9057
Aug. 24	5	5903	0.0008	0.9065
Aug. 25	50	5953	0.0077	0.9142
Aug. 26	43	5996	0.0066	0.9208
Aug. 27	99	6095	0.0152	0.9360
Aug. 28	53	6148	0.0081	0.9441
Aug. 29	32	6180	0.0049	0.9490

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Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
Aug. 30	19	6199	0.0029	0.9519
Aug. 31	35	6234	0.0054	0.9573
Sept. 1	7	6241	0.0011	0.9584
Sept. 2	16	6257	0.0025	0.9608
Sept. 3	14	6271	0.0021	0.9630
Sept. 4	19	6290	0.0029	0.9659
Sept. 5	3	6293	0.0005	0.9664
Sept. 6	0	6293	0.0000	0.9664
Sept. 7	4	6297	0.0006	0.9670
Sept. 8	2	6299	0.0003	0.9673
Sept. 9	7	6306	0.0011	0.9684
Sept. 10	9	6315	0.0014	0.9697
Sept. 11	0	6315	0.0000	0.9697
Sept. 12	17	6332	0.0026	0.9724
Sept. 13	0	6332	0.0000	0.9724
Sept. 14	11	6343	0.0017	0.9740
Sept. 15	0	6343	0.0000	0.9740
Sept. 16	1	6344	0.0002	0.9742
Sept. 17	7	6351	0.0011	0.9753
Sept. 18	8	6359	0.0012	0.9765
Sept. 19	42	6401	0.0064	0.9830
Sept. 20	60	6461	0.0092	0.9922
Sept. 21	29	6490	0.0045	0.9966
Sept. 22	5	6495	0.0008	0.9974
Sept. 23	0	6495	0.0000	0.9974
Sept. 24	1	6496	0.0002	0.9975
Sept. 25	0	6496	0.0000	0.9975
Sept. 26	1	6497	0.0002	0.9977
Sept. 27	0	6497	0.0000	0.9977
Sept. 28	0	6497	0.0000	0.9977
Sept. 29	2	6499	0.0003	0.9980
Sept. 30	0	6499	0.0000	0.9980
Oct. 1	0	6499	0.0000	0.9980
Oct. 2	1	6500	0.0002	0.9982
Oct. 3	1	6501	0.0002	0.9983
Oct. 4	4	6505	0.0006	0.9989
Oct. 5	1	6506	0.0002	0.9991
Oct. 6	0	6506	0.0000	0.9991
Oct. 7	0	6506	0.0000	0.9991
Oct. 8	1	6507	0.0002	0.9992
Oct. 9	0	6507	0.0000	0.9992
Oct. 10	0	6507	0.0000	0.9992
Oct. 11	4	6511	0.0006	0.9998
Oct. 12	0	6511	0.0000	0.9998
Oct. 13	0	6511	0.0000	0.9998

--Continued--

Appendix B.3. (page 4 of 4.)

Date	Daily Count	Cumulative Count	Daily Proportion of Total	Cumulative Proportion of Total
Oct. 14	0	6511	0.0000	0.9998
Oct. 15	0	6511	0.0000	0.9998
Oct. 16	0	6511	0.0000	0.9998
Oct. 17	1	6512	0.0002	1.0000
Oct. 18	0	6512	0.0000	1.0000
Oct. 19	0	6512	0.0000	1.0000
Oct. 20	0	6512	0.0000	1.0000
Oct. 21	0	6512	0.0000	1.0000
Oct. 22	0	6512	0.0000	1.0000
Oct. 23	0	6512	0.0000	1.0000
Oct. 24	0	6512	0.0000	1.0000

Mean Day of Migration = Aug. 10 Variance = 167.9 Days squared

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